RESPONSE TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY JUNE 26, 2006 COMMENTS ON THE PRELIMINARY SCREENING SUMMARY OF CONTROL TECHNOLOGIES AND ALTERNATIVES

Combined Sewer Overflow Long Term Control Plan
City of Rock Island, Illinois
July 27, 2006

Comment:

Section 3.I (1)

Section 3.1, Paragraph 2 notes: "Results from the 10-year storm analysis were used along with the 56-years of record to size the high rate treatment equipment...." Please provide further details on the sizing process.

Response:

The ten year storm analysis provided a conservative estimate of the maximum flow rate that will be delivered to the consolidated high rate treatment location. The STORAGE/TREATMENT model, modified to contain different storage and high rate treatment options, estimated hourly flow rates and volumes for the 56-year rainfall record. Results from the STORAGE/TREATMENT model were statistically analyzed to determine which combinations of storage and treatment would achieve compliance with the presumption approach.

Comment:

Section 3.I (2)

Further, this section notes that a 10-year, 1-hour storm is consistent with the City's current design standard, which is noted as a 10-year 24-hour storm, and existing collection system conveyance capacity. Please provide further discussion of this "consistency".

Response:

The ten-year, one-hour storm is the ten-year storm that generates the highest flow rates and thus it is slightly more conservative than the City's design standard for designing conveyance facilities. The City prefers to be conservative considering that this standard is being used to orchestrate the permanent closure of several sewer system relief points (CSO outfalls). Increased sewer system surcharge and flooding will result if the newly constructed facilities are not large enough. Also, the areas that would need additional reinforcement due to under sizing are difficult to construct in. The City would prefer to avoid having to do additional CSO remediation work in these areas.

Comment:

Sections 4.0, 5.0, 6.0

Rock Island discusses conveyance and treatment controls in general in Sections 4.0 and 5.0, respectively. Specific alternatives are then put forth in Section 6.0. The specific alternatives are then subjected to a preliminary screening which determines which alternatives are carried forward. However, Rock Island does not always clearly state why a control method has not been carried forward from Sections 4.0 and 5.0 to Section 6.0. For example, storage tanks that eliminate Outfalls 003-007 are discussed in Tables 4-1 and 4-2. Section 4.2.2 notes that storage "shows promise". However, in Section 6.0, Development and Analysis of Preliminary Assembled Alternatives, with the exception of a storage tank to control local flooding, storage appears to have been dropped from consideration. No explanation is given of why storage was dropped. Also, no consideration seems to have been given to consolidated storage. This is also the case with "Stormwater (clearwater) source removal" and "Removal of River Infiltration" which appear in Table 4-2. It is not clear that the "Stormwater (clearwater) source removal" in Table 4-2 is the same as that presented as Alternative 5. The City should explain why storage (including consolidated storage), "Stormwater (clearwater) source removal" and "Removal of River Infiltration" appear to have been eliminated as feasible CSO control alternatives. A clearer connection between the controls discussed in Sections 4.0 and 5.0, and those assembled in Section 6.0 is needed, especially when a control is dropped.

Response:

Five million gallons of consolidated storage was incorporated into the high rate primary treatment facilities proposed for all Northside alternatives at Outfall 001 (the WWTP). Each proposed treatment facility would operate as a storage basin until all of the storage capacity is filled, at which point it would start operating as a primary clarifier. Storage was not proposed in other locations because of a lack of available land, incompatible land use, and difficult below-the-water-table construction. As shown in Figure 1 (attached), at least a 15 MG storage tank would be required to fulfill the requirements of the presumption approach with no other controls at Outfall 001. The cost for a storage facility of this magnitude would be about three times the cost of the tanks proposed in the recommended plan. Using all storage to meet the presumption approach instead of a combination of storage and treatment would increase the cost of the recommended plan by almost 50% (from $52.3 million to $77.7 million).

Stormwater source removal is one of the key components of Alternative 5.

In the spring of 2005, the City conducted groundwater and system flow monitoring to find sources of river infiltration. During the monitoring period, the river stage did not rise to a level that has been historically shown to cause increased sewer flow and thus no infiltration sources were discovered. The sewer inspection performed as part of the system characterization did not identify any locations of river inflow. It is suspected that elevated river stage causes elevated groundwater levels behind the levee that can infiltrate the interceptor, local collectors, and possibly be introduced through downtown building drain dewatering over a wide area. The City

will continue to look for and take advantage of opportunities to reduce river infiltration through continued groundwater and system monitoring. No specific reliable cost effective remedial actions to deal with this problem could be identified based on existing information.

Comment:

Table 4-2 (1)

As a general comment about Table 4-2, U.S. EPA does not understand how the numbers in the table were generated. Please provide further, general explanation on how the numbers were generated.

Response:

The numbers in Table 4-2 were generated using the SWMM models as described in Section 4.2.1. Further details on the SWMM models are provided in the Collection System Hydraulic Model Technical Memorandum submitted to the USEPA on December 1, 2004. Partial separation, full separation, and stormwater source removal were modeled by changing the area parameters for the affected basins in the SWMM RUNOFF module. The model basin areas were adjusted according to the runoff/rainfall relationship for the proposed sewer type. Removal of river infiltration was modeled by changing the modeled variable dry weather flow to a constant average dry weather flow value.

Comment:

Table 4-2 (2)

The "Remove River Inflow" Control shown on Table 4-2 provides no decrease in CSO frequency and maximum flow rate, and a minor decrease from 28 to 26 in maximum number of overflows, but significantly reduces CSO duration from 828 hours to 65 hours. What does maximum duration represent and are the maximum durations shown annual?

Response:

The maximum durations shown on Table 4-2 are the maximum event durations obtained when modeling the 56-year rainfall record in the STORAGE/TREATMENT model. They are, not average annual maximum durations.

Comment:

Table 4-2 (2)

Also please provide further discussion of the Remove River Inflow Control, especially with respect to maximum duration reduction.

Response:

Wet weather flow due to river infiltration decreases the treatment plant's capacity to treat additional wet weather flow due to a local rain event. Consequently, when the river stage is high, the amount of rainfall required to cause an overflow is smaller than when the river stage is normal. This results in more days of overflow. The City has experienced some particularly wet years where CSO 001 has discharged wet weather flow at least once every 24 hours for over a month because of frequent rainfall and very high river stage (causing excessive sewer system infiltration and severely reduced WWTP capacity). Since overflows occurring within 24 hours of each other are considered one overflow event, conditions such as this result in one very long overflow event (up to 828 hours according to the SWMM model). Removing the river infiltration would restore WWTP capacity and thereby greatly reduce the number of overflow days, particularly during months with many small rainfall events. Overflows would occur less frequently due to the decrease in river infiltration which would reduce the number of consecutive overflow days and thereby reduce the duration of individual overflow events (to a maximum of 65 hours according to the SWMM model).

Comment:

Table 4-2 (3)

In Table 4-2, is the "maximum" associated with a design storm? Did Rock Island evaluate any of the controls on a "typical" or "average" year basis?

Response:

As stated above, the maximum durations shown on Table 4-2 are the maximum event durations obtained when modeling the 56-year rainfall record in the STORAGE/TREATMENT model. They are not associated with a particular design storm.

All of the source reduction technologies and the no action technology were evaluated to determine the average annual number of overflows with implementation of the technology. These numbers are listed in Table 4-2.

Comment:

Sections 4.0 and 6.0 (1)

Section 4 discusses full and partial separation for the north side and stormwater removal for the south side. Would the stormwater removal on the south side be considered partial separation?

Response:

Partial separation has already been completed on the southside. Stormwater removal would involve the disconnection of rainfall derived infiltration and inflow from private property.

Comment:

Sections 4.0 and 6.0 (2)

Are the full and partial separation of the north side represented by Alternatives 1a and 1b?

Response:

Yes.

Comment:

Sections 4.0 and 6.0 (3)

Section 6.1.2 describes north side full separation. Why would a new primary treatment facility be necessary at the WWTP if full separation is performed?

Response:

The SWMM model indicated that even with full separation of the existing combined sewer service area (the partially separated sewer service portions of the system remain the same), the presumption approach will not be fulfilled at Outfall 001. Thus, a primary treatment facility must be constructed such that all but an average of four and a maximum of six wet weather discharge events per year receive at least primary treatment. Even in fully separated systems some storm water enters the sewer system. Also, full separation would only be completed for currently combined areas. The partially separated areas of the City would continue to contribute private property rainfall derived infiltration and inflow to the sewer system.

Comment:

Sections 4.0 and 6.0 (4)

Is Alternative 5 full separation for the south side? If not, a cost for full separation of the south side should be presented.

Response:

Alternative 5 would fully separate the part of the southside highlighted on page 11 (in Table 4-1). The cost to fully separate the City of Rock Island is shown according to sewer basin in Table 1 below.

Table 1

Cost to Fully Separate All Rock Island Sewers

SEWER BASIN	COST TO FULLY SEPARATE
Northside	$109.5 million
Black Hawk	$11.8 million
Southside (not including Black Hawk)	$21.5 million
TOTAL	$142.8 million

This cost is almost three times that of the recommended plan. In addition, it would cause massive construction disruption throughout the City as it would require work on almost every property. Costs to make these changes would likely be borne by the individual property owners. The socioeconomic impact of this course of action has not been evaluated.

Comment:

Section 5.4

Rock Island notes that the aeration system at the WWTP has the greatest design capacity, at 26 MGD. The City's Collection System and Capacity Technical Memorandum (September 2004) notes that the grit basins have the lowest design capacity at 16.6 MGD, with the other treatment units falling somewhere in between 26 and 16.6 MGD. Has Rock Island considered bringing the rest of the plant up to the design capacity of the aeration basins so as to be able to fully utilize the secondary capacity of the plant?

Response:

Rock Island has considered increasing the treatment plant capacity as discussed in Section 5.4.

Comment:

Section 5.4

Referring to Table 5-1 of the City's Detailed Alternative Analysis and Recommended Control Plan, submitted after this Preliminary Screening Summary of Control Technologies and Alternatives, will the proposed wastewater treatment plant improvements eventually increase the primary treatment design capacity above 16.6 MGD?

Response:

No increases to the WWTP primary treatment capacity are proposed in the alternatives, including the recommended plan. The enhanced primary treatment listed in Table 5-1 will be a new separate wet weather treatment facility located by the existing WWTP. Wet weather discharge from this facility will go directly to Outfall 001 or be drained to the WWTP headworks facility as capacity becomes available.

Comment:

General Comments

Paragraph 5(c) of Appendix A of the Consent Decree discusses the preliminary screening of alternatives. It notes that the preliminary screening must include "an evaluation of varying levels of control for each alternative that will reduce the number of untreated CSOs down to a range of overflows per CSO outfall per year (such as 0, 1 to 3, 4 to 7, and 8 to 12)." The City seems to have only considered one level of control, that which produces four overflows in a typical year and a maximum of six overflows. The City should develop additional control alternatives that cover different levels of control, including those that achieve fewer than four overflows in a typical year.

Response:

Rock Island has considered two different levels of control: control to meet the presumption approach and control to achieve zero overflows per year. The USEPA has indicated that it will not consider Rock Island to be in compliance with the presumption approach if it has more than an average of 4 overflows per year that receive no treatment beyond screening and disinfection. As such, the City sees no value in developing alternatives with levels of control less than that specified by the presumption approach (such as 4 to 7 or 8 to 12 overflows per year).

In Rock Island, it is more difficult to ensure that no more than 6 overflows will occur in any given year than to achieve an average of 4 overflows per year. Facilities that prevent the City from having more than 6 overflows in any year reduce the average number of overflows to less than 2 per year. Since this is within the 1 to 3 overflows per year range and the higher ranges are not applicable (as discussed above), the only other range to evaluated was zero. The sizes of storage and treatment facilities that would be required to achieve zero overflows per year are shown in Table 4-2. These storage and/or treatment facilities would have to be 3.5 to 26 times larger than those that meet the presumption approach. The additional cost required to build such facilities would be significant and provide virtually no additional water quality benefits.

Comment:

General Comments

Rock Island seems to target four overflows per year as the goal (although the City provides a target of 1.6 overflows per year in its May 26, 2006 letter titled "'Response to United States Environmental Protection Agency April 26, 2006 Comments on the Post-Construction Monitoring Plan and Appendix"). As noted above, a range of level of controls must be considered. It would be helpful if before and after volume and overflow information was also presented. This would include frequency and volume of overflow before implementation, remaining overflow volume and frequency at each outfall, and overall percent capture associated with each alternative and level of control.

Response:

The CSO volume reductions provided by the various source control technologies are shown on Table 4-2. Wet weather discharge frequency and volume for the final control alternatives are shown in Tables 2 and 3 below.

Table 2
Northside Untreated* Overflow Frequency and Volume
(as estimated by the SWMM Model)

OUTFALL AND PARAMETER		ALTERNATIVES				
		Existing	1A	1B	2B & 3	4
001	Average Annual # Overflow Events	16.8	1.6	1.9	1.6	1.8
	Maximum # Overflow Events in a Year	28	6	6	5	6
	Average Annual Overflow Volume (MG)	139.7	2.7	3.3	6.8	6.8
	% Capture	-	98%	98%	95%	95%
003 & 004	Average Annual # Overflow Events	6.1	0	0	0	-
	Maximum # Overflow Events in a Year	12	0	0	0	-
	Average Annual Overflow Volume (MG)	2.5	0	0	0	-
	% Capture	-	100%	100%	100%	-
005	Average Annual # Overflow Events	13.4	0	0	0	-
	Maximum # Overflow Events in a Year	21	0	0	0	-
	Average Annual Overflow Volume (MG)	10.4	0	0	0	-
	% Capture	-	100%	100%	100%	-
006	Average Annual # Overflow Events	1.9	0	0	0	-
	Maximum # Overflow Events in a Year	5	0	0	0	-
	Average Annual Overflow Volume (MG)	0.4	0	0	0	-
	% Capture	-	100%	100%	100%	-
New CSO**	Average Annual # Overflow Events	-	-	-	-	1.2
	Maximum # Overflow Events in a Year	-	-	-	-	5
	Average Annual Overflow Volume (MG)	-	-	-	-	1.4
	% Capture	-	-	-	-	89%

*overflows are disinfected during the recreation season and screened for all alternatives except for "existing"
**new consolidated northside CSO downstream of Centennial Bridge
Note: Level of control for all alternatives in the presumption approach. The presumption approach requires no more than 6 overflow events in any one year and no greater than an average of 4 overflow events per year.

Table 3
Southside Overflow Frequency and Volume
(as estimated by the SWMM Model)

OUTFALL AND PARAMETER		ALTERNATIVES			
		Existing	5	6A & 8A	6B
007*	Average Annual # Overflow Events	1.3	0.1	0.7	0.8
	Maximum # Overflow Events in a Year	5	1	3	4
	Average Annual Overflow Volume (MG)	1.5	0.1	0.7	1.3
	% Capture	-	93%	53%	13%
011**	Average Annual # Overflow Events	3.3	0.04	3.3	3.3
	Maximum # Overflow Events in a Year	9	1	9	9
	% Capture	-	99.9%	0%	0%
012**	Average Annual # Overflow Events	3.2	0	3.2	3.2
	Maximum # Overflow Events in a Year	9	0	9	9
	% Capture	-	100%	0%	0%

*overflows are disinfected during the recreation season and screened for all alternatives except for "existing"

**overflows receiving the equivalent of primary treatment or better and disinfection during the recreation season

Note: Level of control for all alternatives in the presumption approach. The presumption approach requires no more than 6 overflow events in any one year and no greater than an average of 4 overflow events per year. The STORAGE/TREATMENT model overestimates overflow volumes for Outfalls 011 and 012 and thus an estimate for average annual overflow volume cannot be obtained.

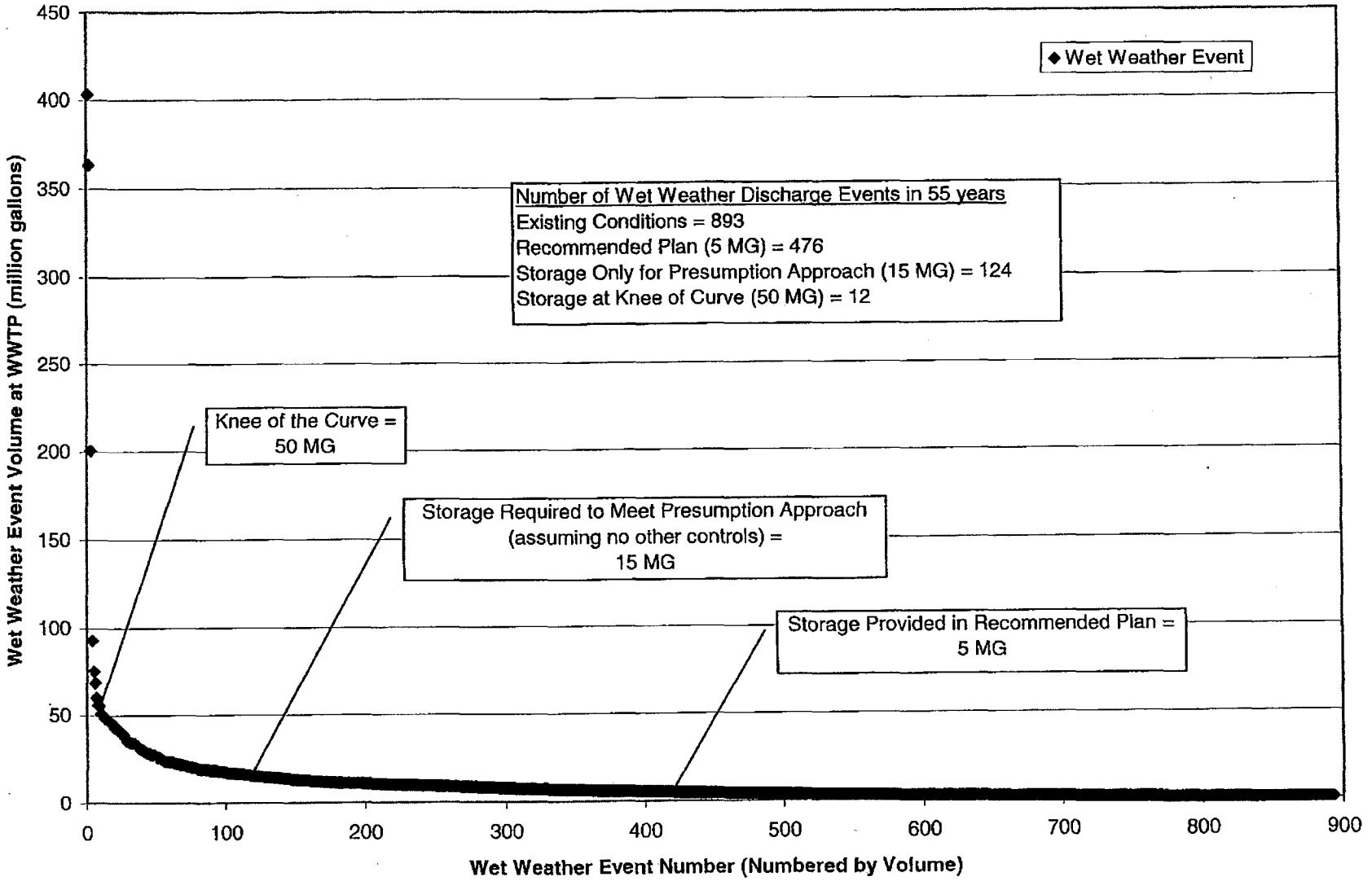

FIGURE 1
WET WEATHER VOLUME IN EXCESS OF WWTP CAPACITY BY EVENT FOR ALTERNATIVE 3
(DETERMINED USING THE SWMM MODEL AND 55-YEAR RAINFALL RECORD)

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overflow volume graph